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Danielle Nicole Gannon*, 11283 CR 24, Middlebury, IN 46540, and **Natalie Domelle** and **Lucy Flesch**. *Preliminary Report on the Modeling of Surface Velocities and Fault Rotations*. Preliminary report.

It has been proposed that coherent rotational structures can be modeled using an extension of traditional continuum mechanics known as polar field theory. Surface velocities were plotted using Generic Mapping Tools software with GPS data taken from previous research. Some of the data had variances that were half or more of their observed velocities and were removed in order to obtain a better model. This model was then used to spline interpolate between observed strain rates inferred from GPS data to determine a continuous deformation tensor for the western United States. The tensor was used to find the internal and external rotation along faults. External rotation was calculated with the equation: $\frac{d\theta}{dt} = \omega + \epsilon_{xy} \cos(2\theta) + \frac{1}{2}[\epsilon_{yy} - \epsilon_{xx}] \sin(2\theta)$, where $\frac{d\theta}{dt}$ is external rotation, ω is observed rotation, ϵ_{xx} , ϵ_{yy} and ϵ_{xy} are strain rates, and θ is the strike of the fault. Internal rotation was found by subtracting the external rotation from the observed rotation. By obtaining the rotations, we can find areas in the western United States that are rotating uniformly and this will be used to identify coherent structures, to be utilized in the model. (Received July 27, 2010)